

## WHAT IS CLAIMED IS:

1. A method of fabricating a steel part by forging, the method being characterized by the following steps:
  - preparing and casting a steel having the following composition in percentages by weight:  $0.06\% \leq C \leq 0.35\%$ ;  $0.5\% \leq Mn \leq 2\%$ ; traces  $\leq Si \leq 2\%$ ; traces  $\leq Ni \leq 1.5\%$ ; traces  $\leq Al \leq 0.1\%$ ; traces  $\leq Cr \leq 1.5\%$ ; traces  $\leq Mo \leq 0.30\%$ ; traces  $\leq V \leq 0.5\%$ ; traces  $\leq Cu \leq 1.5\%$ ; the remainder being iron and impurities that result from preparation;
  - forging a blank for the part at a temperature in the range  $110^{\circ}C$  to  $1300^{\circ}C$ ;
  - cooling the blank for the part in controlled manner in still or forged air at a speed less than or equal to  $3^{\circ}C/s$  in the range  $600^{\circ}C$  to  $300^{\circ}C$ , thereby imparting a bainite microstructure to the blank;
  - machining the part; and
  - performing a mechanical reinforcing operation on the part at locations that are to be subjected to particularly high levels of stress.
2. A method according to claim 1, wherein the steel contains 5 ppm to 50 ppm of B.
- 25 3. A method according to claim 1, wherein the steel contains 0.005% to 0.04% of Ti.
- (1) 4. A method according to claims 2 and 3 taken together, wherein the steel contains 0.005% to 0.04% of Ti, and wherein the Ti content is equal to not less than 3.5 times the N content of the steel.
- 30 5. A method according to claim 1, wherein the steel contains 0.005% to 0.06% of Nb.
- 35 6. A method according to claim 1, wherein the steel contains 0.005% to 0.2% of S.

7. A method according to claim 6, wherein the steel contains at least one of the following elements: Ca up to 0.007%; Te up to 0.03%; Se up to 0.05%; Bi up to 0.015%;  
5 and Pb up to 0.15%.
8. A method according to claim 1, wherein the C content of the steel lies in the range 0.06% to 0.20%.
- 10 9. A method according to claim 8, wherein the Mn content of the steel lies in the range 0.5% to 1.5%, and wherein the Cr content lies in the range 0.05% to 1.5%.
- 15 10. A method according to claim 8, wherein the Cu content of the steel lies in the range 0.5% to 1.5%.
11. A method according to claim 1, wherein the C content of the steel lies in the range 0.25% to 0.35%, the Si content lies in the range traces to 0.5%, the Mn content  
20 lies in the range 0.8% to 2%, the Cr content lies in the range 0.5% to 1.5%, the Mo content lies in the range 0.05% to 0.20%, the B content lies in the range 5 ppm to 50 mm, and the Ti content lies in the range 0.005% to 0.04%.
- 25 12. A method according to claim 1, wherein the C content of the steel lies in the range 0.20% to 0.35%, the Si content lies in the range 0.5% to 2%, the Mn content lies in the range 0.8% to 2%, the chromium content lies in the  
30 range 0.5% to 1.5%, the molybdenum content lies in the range 0.05% to 0.20%, the boron content lies in range traces to 50 ppm, and the Ti content lies in the range 0.005% to 0.04%.
- 35 13. A method according to claim 12, wherein annealing is performed in the range 300°C to 500°C for a period of 1 h

to 3 h after machining or after controlled cooling in air and prior to machining.

5 14. A method according to claim 1, wherein the mechanical reinforcing operation is burnishing.

15. A steel forging, obtained by the method according to claim 1.

10 16. A steel forging according to claim 15, constituting a crank shaft for an IC engine.

15 17. A steel forging according to claim 16, wherein the mechanical reinforcing operation is performed on the fillets connecting the crank pins and the bearings of the crank shaft.